EXECUTIVE SUMMARY

This report is an assessment of the habitat factors limiting salmon productivity in the freshwater streams and nearshore saltwater habitats of Water Resource Inventory Area (WRIA) 6. This WRIA overlaps Island County, including Whidbey, Camano, Ben Sur, Smith and Strawberry Islands. Whidbey and Camano, the two largest islands, are the focus of the document. Together they cover about 538 km^2 and include 123 sub-basins.

Watershed Description

The natural characteristics of WRIA 6 are directly affected by human population and land use. Island County is the second smallest but second fastest growing county in Washington State. Between 1980 and 1990, the County's population grew by 37 %, the highest in the state. The 1997 population was 71,600. The incorporated Urban Growth Areas of Oak Harbor, Langley and Coupeville total 12.8 km^2. Government lands total 42.8 km^2, including state parks and Whidbey Naval Air Station. Sixty-two percent (329.2 km^2) of Island County's land is zoned for residential land use. Lands zoned for forest management (44.5 km^2) and agriculture (18.6 km^2) comprise 12 % of County land. About 45 % of these parcels have not been developed.

Agriculture has been an important historical land use in WRIA 6, though it is relatively small in comparison to other counties. In 1997, there were 622 parcels (52.8 km^2) of land in agricultural tax programs. Of this total, 40.2 km^2 were in parcels 0.08 km^2 (20 ac) or larger. In 1987, there were only 4 farms over 2.0 km^2 in size.

Island County considers its housing stock to be its "largest long-term capital asset." Residential development encompasses much of the WRIA 6 shoreline and is expanding into rural and forested areas. The shorelines are in high demand for private beachfront homes and sites with scenic vistas of the water and mountains. The parcels comprising nearly 80 % of the County's shoreline are developed, primarily with platted single-family communities.

Distribution and Condition of Stocks

Virtually no historical information concerning the presence of anadromous salmonids in WRIA 6 was located in the course of preparing this report. Some local residents reported seeing "salmon" or knew of someone that had seen "salmon" in locations where the fish are yet to be documented. A systematic interview of long-time County residents is probably the only way to obtain an historic perspective of fish presence in this area.

What is known is that the islands in WRIA 6 are located at the junction to Puget Sound and in front of some of the most productive salmon-producing rivers (Snohomish, Stillaguamish, Skagit) in western Washington. Historically, this area has served as "one of the most important and critical harvest areas for commercial and sport fisheries." From a regional standpoint, Island County's major contribution to salmon productivity is its

nearshore habitats. The WDFW marine fry nearshore surveys for WRIA 6 are used to forecast the number of adult pink and chum salmon returning to the Snohomish and Stillaguamish Rivers. Juvenile chinook caught for research purposes in the nearshore habitat of north Whidbey Island were assumed to originate from the Skagit River. All species of juvenile salmon use nearshore habitats in Puget Sound at either the fry and/or smolt life stages. Nearshore habitats are also important to migrating adult salmon. The WRIA 6 nearshore environment includes numerous estuaries and salt marshes and provides important habitat for spawning herring and other species that are food for salmonids.

Most WRIA 6 streams are intermittent or ephemeral, and generally do not provide a sufficient flow of water to support salmonids. Others, such as Maxwelton and Glendale Creeks on Whidbey Island, are *presumed* to flow throughout their length year-round and to support small populations of resident and anadromous salmonids. Six sub-basins in WRIA 6 are currently known or presumed to support salmonids. Ten more sub-basins have been identified as having potential to provide salmonid habitat.

The streams in Island County have received little attention from fisheries managers because they are too small to support commercial runs. Accordingly, there has yet to be a systematic survey of existing salmonid habitats and populations. Most of the information documenting fish presence was gathered by WDFW personnel as part of culvert and flow inventories conducted for regulatory purposes (Base 1999).

The 1992 *Washington State Salmon and Steelhead Stock Inventory* (SASSI) identifies only one stock in WRIA 6. Coho are described for the Maxwelton Creek drainage but stock status is unknown. Coho and chum are known to occur in freshwater streams on Whidbey Island. The origin of both stocks is unknown. Coastal cutthroat are present in streams on Whidbey and Camano Islands. A systematic stream survey and genetic analysis of all salmonid species in this WRIA are warranted. The intent of the state legislation that fostered this report is to focus restoration and protection efforts on salmon populations that are “capable of self-sustaining, natural production.”

There has been no systematic survey of salmonid use of nearshore and estuarine habitats in WRIA 6. Data from four state and tribal studies are used in this report to document nearshore habitat use by chum, pink, chinook, coho, sockeye, steelhead and char at several locations in WRIA 6. Twenty estuary/salt marsh sites in WRIA 6 are presumed to support or identified as having potential to support salmonids.

In March 1999, Puget Sound chinook stocks were designated as threatened under the federal Endangered Species Act. There are no streams in WRIA 6 of sufficient size or flow to provide spawning habitat for adult chinook. However, juveniles may use the lower stream reaches for rearing, and they are presumed to use the entire nearshore habitat of WRIA 6. They have been documented along the shoreline at: the north end of Whidbey Island, and the south end of Whidbey and Camano Islands.

In October 1999, bull trout were listed as threatened under the federal Endangered Species Act. Neither bull trout nor Dolly Varden are known to occur in the fresh waters of WRIA 6. Native char are presumed to use nearshore habitat, but only one Dolly Varden is documented in the data sources used in this report. Bulltrout and coastal cutthroat are reportedly caught by sport fishermen in some nearshore areas of WRIA 6.

Habitat Limiting Factors

There are several habitat factors negatively affecting salmon and their habitats in WRIA 6. The major factors are discussed below.

Streamflow. Low flows are presumed to be a key habitat factor in this WRIA. However, streamflow data are sorely needed for most of the streams known to support or identified as having the potential to support salmon. The TAG did not have enough information to accurately pinpoint temporal and spatial flow deficiencies or to determine that low flows are not an issue.

The streams in Island County are tiny when compared to the rivers found in other parts of Puget Sound. Most are short, coastal tributaries that flow intermittently due to precipitation patterns, lack of snow accumulation, soil conditions, and topography. They tend to be shallow, have relatively low discharge, and reduced flows during the summer months when precipitation is low. Wetlands and groundwater springs provide the headwaters and baseflows. The perennial streams are predominantly located in the southern part of Whidbey Island, and are fed by year-round springs and forested wetlands. They often have shallow gradients and low velocity. These streams are too small to support habitat for adult chinook salmon, pink salmon, and steelhead.

In Puget Sound, low streamflows are generally most problematic from July through September. The cumulative effect of groundwater withdrawals and loss of wetlands can contribute to low flows. Low flows can cause salmon to be stranded, limit or impede salmon migration, and contribute to a decrease in dissolved oxygen, an increase in water temperature, and an increase in the concentration of pollutants. A cursory analysis of projected effective impervious area suggests that if the County's zoning designations are actualized, impaired and moderately impaired streamflows may be expected in most of the known and potential fish-bearing sub-basins in WRIA 6. Hence, the potential exists for future reductions in streams with naturally low streamflows and for "flashy" streamflows similar to what has happened to many urban streams in Puget Sound.

Access. Access is a major habitat factor in WRIA 6. Culverts, tide gates, and dikes are the main structures impeding or preventing fish passage. A few small dams are also present. There are only four sites, identified as being important to salmon, which do not have access issues. Only a limited amount of information was available for two additional sites. They require further investigation.

Low stream flow or temperature conditions can also function as barriers to fish passage during certain times of the year, particularly during the summer. As discussed above, data

are currently lacking to determine if these types of access problems exist at any of the known or potential salmon-bearing sites.

Flooding and Tidal Flows. Freshwater and tidal flooding and storm-related flooding are natural processes that are critical to creating and maintaining the health of floodplain and nearshore ecosystems for salmon and other organisms. Flooding occurs generally in the winter in concert with storms, high tides, and seasonally high precipitation. The last large flood event occurred in December 1996. Low-lying areas along the west shoreline of Whidbey Island are most susceptible to flooding from storm surges and high wind-generated waves.

Much of the habitat damage to the salt marshes and estuaries in WRIA 6 has resulted from the loss of connectivity to Puget Sound tidal waters. Agriculture and shoreline residential development has had the biggest impacts on tidal connectivity. In the early 1900s, drainage districts were established in agricultural areas to move water off of the land and allow for development. In more recent decades, numerous residential developments have been constructed on natural or augmented sand spits to raise homes above tidal flood levels, creating a barrier to saltwater flow.

The larger sites that have been impacted by a loss of tidal connectivity include Deer Lagoon, Crockett Lake, Cultus Bay, Swantown Marsh, Maxwelton Estuary, and Crescent Marsh. Copies of historical topographic surveys of the WRIA 6 coastline dating back to the mid-1880s are included in this report, along with recent aerial photos, to give the reader a visual idea of how these sites have been impacted by human land uses. These historic maps may be used in the future to guide restoration efforts.

Riparian Conditions. There is currently no quantitative information concerning the riparian zones for streams and estuaries in WRIA 6. Qualitative field assessments have been made in the course of completing this report. Generally speaking, the riparian zones in agricultural and urban areas have been the most heavily degraded, and in some areas, are totally gone.

Estuary and Nearshore Habitats. Whidbey and Camano Islands historically supported a number of estuaries and other nearshore ecosystems. As already mentioned, most of these sites have been heavily modified by agricultural, residential and other land uses. Other nearshore sites are still functioning with natural processes but are under private ownership and vulnerable to future disturbance. Loss of access to fish passage, loss of connectivity between streams and tidal waters, and degraded riparian habitat are the main habitat factors.

Shoreline residential homes continue to have a major impact on the nearshore environment. Once the homes are built, property owners often construct bulkheads to protect them from erosion. Bulkheads, docks, groins, and marinas all impact salmon habitat. Water quality impacts occur when septic systems are installed for domestic sewage and experience flooding in relation to naturally fluctuating water levels.

Non-native cordgrasses (*Spartina)* also pose a threat to some WRIA 6 nearshore areas. Cordgrass invasions eliminate native salt marsh vegetation, displace native plants and animals, raise the elevation of the estuary substrate, and lead to an increase in flooding. The primary areas targeted for *Spartina* control are located around the north half of Camano Island. They include Davis Slough, West Pass, Livingston Bay and Triangle Cove. Much smaller infestations occur around Whidbey Island. There, control activities are in place at Cultus Bay, Deer Lagoon, Lake Hancock, and other locations.

Water Quality. Nonpoint source pollution is a major cause of water quality pollution in Puget Sound. For salmonids, high water temperature and low dissolved oxygen are the main water quality concerns. High temperatures can lower dissolved oxygen, impair the immune system of salmon, and give non-native warm water species a competitive edge over native salmonids. There are limited water quality data available for known and potential salmon-bearing streams in WRIA 6, but most of the information was gathered at times when temperature and dissolved oxygen conditions would not be expected to be problematic. Additional low flow data are needed for all of the known and potential salmon-bearing streams identified in this report.

Habitat In Need of Protection

Properly functioning habitat is the most cost-effective habitat to protect. The ability to restore degraded habitat back to its proper function is limited by our technical knowledge of the complex interactions associated with the different habitat types. Within WRIA 6, the vast majority of the salmon habitat has been impacted, at some level, by human activities. Habitats in need of protection within the sub-basins and along the coastal shoreline are those areas that still retain a significant portion of their original habitat functions or possess a high potential for restoration.

Lake Hancock is one the best examples in WRIA 6 of a coastal intertidal environment that still resembles the native ecosystem. It is now managed as a protected area by Whidbey NAS and The Nature Conservancy of Washington. In this report, a few other small, coastal wetlands and freshwater streams are identified to be functioning relatively well under natural processes but still existing in private ownership without formal protection. They are located on the east shoreline of Whidbey Island and include Grasser's Lagoon, Harrington Lagoon, and Race Lagoon. Cultus Bay, Triangle Cove, Deer Lagoon, Swantown Marsh, Maxwelton Estuary, and Crockett Lake are much larger nearshore sites that also deserve protection but will require restoration.

Freshwater stream systems that still maintain a low level of development and relatively healthy riparian corridors include Glendale, Cultus, North Bluff, Chapman, and Deer Creeks. All of these streams have barriers to fish access that need to be remedied, and will require some localized riparian and channel restoration, but the existing hydrological condition is still relatively unimpaired and the streamflows are presumed to be perennial and capable of supporting salmonids throughout much of their length.

Data Gaps

Twenty data gaps are identified for the purpose of guiding future inventory and research needs. The data gaps were compiled from the information sources used to prepare this document and with assistance from the WRIA 6 Technical Advisory Group. High priority items are related fish surveys, streamflow data, estuary and nearshore inventories, and physical habitat surveys.

The land use and land ownership conditions in WRIA 6 present several exciting opportunities for beneficial and relatively cost effective salmon habitat restoration opportunities. This is particularly true for the larger estuaries and saltmarshes in the nearshore environment. Feasibility studies for high priority restoration projects are needed now to identify historical conditions, design restoration options, and address social and economic issues.